# Order Synbranchii

Body eel like. Mouth not protractile, above bordered chiefly by premaxillaries, maxillary poterior and parallel. Lower jaw formed by dentary, articular and angular bones. Teeth in bands or in series in jaws, usually on palatines and pterygoids. Opercular bones normal. Gill membranes united, gill openings confluent below, more or less restricted from above, typically appears as transverse slit. Skull long, without crests or ridges above. Preorbital present, but no suborbitals.

Front vertebrae not modified, without Weberian ossicles. No air bladder. Scales absent or minute, when arranged longitudinally. Lateral line present. Dorsal and anal rayless folds of skin, united with very small caudal of 8 to 10 rays. No pectorals, only membrane bones of arch developed. Ventrals absent or as jugular rudiments.

## Suborder Alaboidea

Mouth small. Palate toothless. Opercles rhomboidal. Skull short, wide, depressed. Vent in anterior half of body. Dorsal and anal well developed. Ventrals present, very small, 2 rayed, just behind gill opening.

### Family Alabeidae

Body eel like. Snout blunt. Eyes advanced, far forward. Mouth small, terminal. Teeth blunt, compressed, uniserial. Gill opening single, on ventral surface. Vertebrae 75, of

which 52 caudal. Body naked.

Small fishes of the Australian coasts, known as "shore eels".

# Genus Alabes Cloquet

Alabes Cloquet, Dict. Sci. Nat., vol. 1, 1816, p. 99 (on Les Alabès Cuvier, Règne Animal, vol. 2, 1817, p. 235. Atypic. "Sea of the Indies"). Type → Alabes cuveriae Mc Clelland, Journ. Asiatic Soc. Bengal, vol. 5, 1845, p. 221.

Alabis Swainson, Nat. Hist. Animals, vol. 1, 1838, p. 225. Atypic. (On Cuvier).

Alaebes Swainson, Nat. Hist. Animals, vol. 2, 1839, p. 336. Atypic. (On Cuvier; error).

Cheilobranchus Richardson, Ichth. Voy. Erebus and Terror, 1844-48, p. 50. Type Cheilobranchus dorsalis Richardson.

Chilobranchus Günther, Cat. Fishes Brit. Mus., vol. 8, 1870, p. 17. Type Cheilobranchus dorsalis Richardson.

Body compressed, subcylindrical in front, moderately elongate. Head small. Snout very obtuse, short. Eye moderate. Mouth narrow, upper jaw slightly protractile. Teeth in jaws uniserial, none on palate. Gill opening transverse, gill membranes not attached to isthmus. Hinder edge of gill opening with raised lip. Gill arches 4, no slit behind fourth. Gills well developed. No accessory breathing sac. Intestine straight, dilation of stomach longer

than intestine, provided with short caecal appendage near upper end. Vent premedian, with minute papilla. Vertical fins reduced to simple cutaneous fold, without rays.

Australia and Tasmania.

Jordan designates Cheilobranchus dorsalis Richardson for Alabes Aken, Isis, 1817, p. 1182, a later reference than Cloquet. Although I have admitted Alabes cuveriae Mc Clelland as it is only printed once in his paper referred to, perhaps even intentional, though of course an error in comparison with the correct form as written by Vaillant.

# Analysis of species

a.' No concave disk between pectoral fins.

b.' Gill opening with free marginal lobes; dorsal begins behind or opposite vent.

c.' On back 14 ~~narrow~~ brown bands, lost on dorsal; sides of abdomen with numerous vertical narrow brown bars, anteriorly crossed by 4 or 5 broad carmine bars below.

parvulus.

c.² Six dark median blotches along side of trunk and front part of tail.

rufus.

b.² Gill opening without free marginal lobes; dorsal begins close behind head.

dorsalis.

a.² Small concave disk between pectoral fins.

cuvieri.

Alabes parvulus (Mc Culloch)
Cheilobranchus parvulus Mc Culloch,
Records Australian Mus., vol. 7, pt. 4,
Aug. 30, 1909, p. 316, fig. 18. Rock pools
near Sydney; Fishes New South Wales,
ed. 2, 1927, p. 22.

Alabes rufus (Macleay)

Chilobranchus rufus Macleay, Proc. Linn. Soc. New South Wales, vol. 6, pt. 2, Sep. 12, 1881, p. 266. Port Jackson; Tasmania. — Steindachner, Sitz. Ber. Akad. Wiss. Wien, Math.-naturw. Klasse, vol. 88, pt. 1, 1883, p. 1107 (Gulf of St. Vincent). — Ogilby, Handbook of Sydney, 1896, p. 119. Cheilobranchus rufus Waite, Records Australian Mus., vol. 6, no. 3, 1906, p. 195, pl. 36, fig. 1 (Port Phillip). — Stead, Fishes of Australia, 1906, p. 43 (Port Jackson). — Fowler, Proc. Acad. Nat. Sci. Philadelphia, 1907, p. 421 (Victoria). — Waite, Records South Australian Mus.,

vol. 2, No. 1, April 23, 1921, p. 48, fig. 71.
— Mc Culloch, Fishes New South Wales,
ed. 2, 1927, p. 22, pl. 8, fig. 76a.

Aleles rufus Fowler, Proc. Acad. Nat.
Sci. Philadelphia, 1912, p. 8 (Victoria
specimens; error).

Symbranchus bengalensis (not Mc Clelland)
Zietz, Trans. Royal Soc. South Australia,
vol. 32, 1908, p. 296.

Depth 9 3/4 to 10 2/5; head 7 3/4 to 8 9/4,
width 1 3/5 to 1 3/5; head and trunk 1 1/2 to 1 2/3
in tail. Snout 3 2/5 to 3 2/3 in head; eye
4 to 4 1/4, greater than to 1 1/4 in snout, subequal with
interorbital; rictus reaches front eye
edge; maxillary 3 1/8 to 3 1/2 in head;

teeth uniserial, compressed, even, ends obtuse; interorbital 4, nearly level. Gill opening small slit under head, transversely, hind edge with short cutaneous flap each side.

Dorsal slight cutaneous fold, inserted trifle nearer gill opening than vent; anal as low fold only on last 3/5 of tail.

Deep russet brown, with 4 rather large dusky brown blotches on side of trunk, last one somewhat behind vent.

Iris brown.

2 examples, and A.N.S.P. Victoria,
Australia. Mrs. Agnes F. Kenyon.
Length 65 to 71 mm.

Kangaroo Island,
87361 U.S.N.M. Australia.

March 6, 1920. C. M. Hay. Length 61 to
83 mm. 8 examples.

5 Alabes dorsalis (Richardson)
3 Cheilobranchus dorsalis Richardson, Ichth.
Voy. Erebus and Terror, 1844-48, p. 50,
pl. 30, figs. 1-5. North west coast of
Australia.

dorsalis
Childbranchus Günther, Cat. Fishes Brit.
Mus., vol. 8, 1870, p. 18 (Tasmania;
Australia; types; types of Cheilobranchus
apterodytum). — Castelnau, Proc. Zool.
Acclimat. Soc. Victoria, vol. 1, 1872, p. 190
(reference). — Schmeltz, Cat. Mus. Godeffroy,
no. 6, 1877, p. 18 (Sydney). — Klunzinger,
Sitz. Ber. Akad. Wiss. Wien, Math.-naturw.
Klasse, vol. 80, pt. 1, 1879, p. 418 (Murray
River). — Macleay, Proc. Linn. Soc. New

South Wales, vol. 6, pt. 2, Sep. 12, 1881, p. 266 (North west Australia).

Cheilobranchus aptenodytum Richardson, Ichth. Voy. Erebus and Terror, 1844-48, p. 51. Above high water marks on Penguin Island, 72° S. Lat.

Cheilobranchus concolor Richardson, Ichth. Voy. Erebus and Terror, 1844-48, p. 51. No locality. (Name in synonymy.)

Alabes cuvieri Mc Clelland

Alabes cuverial Mc Clelland, Calcutta Journ. Nat. Hist., vol. 5, 1845, p. 221. Indian Ocean. (Evidently on Cuvier.)

Alabes cuvieri Vaillant, Nouv. Arch. Mus. Hist. Nat. Paris, ser. 4, vol. 7, 1905, p. 149 (India and New Holland).

## Suborder Synbranchoidea

Mouth moderately large. Palate with crescentic band or series of teeth on palatines and pterygoids. Opercle subtriangular. Skull elongate. Dorsal and anal vestigeal. No ventrals. Vent in posterior half of body.

## Family Synbranchidae

Body elongate, cylindrical, compressed behind. Gills on 3 or 4 branchial arches, well developed or rudimentary. No accessory breathing apparatus. Pectoral arch joined to skull by forked post temporal. Stomach without coecal sac or pyloric coeca. Ovaries with oviducts. No scales. Dorsal and anal reduced to low folds. No ventrals. Vent in posterior half of body.

Eel like fishes in the rivers of India, East Indies, Philippines, China, Japan. Also tropical West Africa, Central and South America.

# Analysis of genera

a'. Synbranchinae. Gills well developed, on 4 branchial arches.

b'. Eyes well developed; teeth in bands; gill opening small; vertebrae rather numerous. Synbranchus.

b². Eyes vestigeal; teeth uniserial, minute on premaxillaries, well developed and obtusely conic on palate and lower jaw; gill opening wide, extends upward above middle of side; vertebrae fewer. Macrotrema.

a². Monopterinae. Gills vestigeal, on 3 branchial arches only; eyes developed; teeth in bands; vertebrae numerous. Monopterus.

Genus Symbranchus Bloch

Symbranchus Bloch, Naturg. Ausland. Fische, vol. 9, pt. 13, 1793, p. 86. Type Symbranchus marmoratus Bloch, designated by Jordan and Evermann, Genera of Fishes, pt. 1, 1917, p. 53.

Symbranchus Günther, Cat. Fishes Brit. Mus., vol. 8, 1870, p. 15. Type Symbranchus marmoratus Bloch.

Unibranchapterura Lacépède, Hist. Nat. Poiss., vol. 5, 1803, p. 658. Type Symbranchus marmoratus Bloch, designated by Jordan and Evermann, Genera of Fishes, pt. 1, 1917, p. 68.

Ophisternon Mc Clelland, Calcutta Journ. Nat. Hist., vol. 5, 1845, pp. 175, 196. Type Ophisternon bengalensis Mc Clelland, designated by Jordan, Genera of Fishes, pt. 2, 1919, p. 220.

Tetrabranchus Bleeker, Naturk. Tijdschr. Nederl. Indie, vol. 2, 1851, p. 69. Type Tetrabranchus microphthalmus Bleeker, monotypic.

Unipertura Kaup, Archiv Naturg., 1856, pt. 1, p. 76. Type Unipertura laevis (Lacépède) Kaup = Ophisternon bengalensis Mc Clelland, orthotypic.

Body elongate, cylindrical, tail well compressed, short, tapers. Eyes small, covered by skin. Lips well developed. Premaxillary teeth small, uniserial, expanded triangularly and triserially at symphysis; outer teeth on palatines and pterygoids, conic, form single arched series; lateral teeth still stronger, uniserial and expanded pluriserially near symphysis. Nostrils oval, above eye; front nostrils minute, near snout tip. Gill membranes not joined with isthmus, have single transverse opening. No accessory breathing sac. Branchiostegals 6. Vertebrae 127

to 137, of which 51 to 57 caudal.
No scales. Lateral line present.

The American form has been observed to live in marshes which at different times of the year dry up. Though the fish bury themselves in the mud similar to Lepidosiren the gill filaments are well developed on the four branchial arches.

Synbranchus bengalensis (Mc Clelland)
Ophisternon bengalensis Mc Clelland,
Calcutta Journ. Nat. Hist., vol. 5, 1844,
p. 197 (204, 220), pl. 11, fig. 1. Bengal.
— Kaup, Cat. Apodal Fish Brit. Mus.,
1856, p. 121, pl. 15, fig. 76 (under view
of head) (Malabar).

✓ Synbranchus bengalensis Bleeker, Atlas
Ichth. Ind. Neerland., vol. 4, 1864, p. 119,
pl. (48) 192, fig. 1 (Java, Borneo, Celebes).
— Day, Fishes of Malabar, 1865, p. 251. —
Schmeltz, Cat. Mus. Godeffroy, No. 4, 1869,
p. 27 (Pelew Islands); No. 7, 1879, p. 59
(Pelew Islands). — Pöhl, Cat. Mus.
Godeffroy, No. 9, 1884, p. 39 (Pelew Islands).

— Weber and Beaufort, Fishes Indo Austral. Archipelago, vol. 3, 1916, p. 416 (Palima, Celebes; Mimika River, New Guinea). — Herre, Philippine Journ. Sci., vol. 23, no. 2, Aug. 1923, p. 126 (Manila Bay, Bay Bay Creek, Apo Reef). — Fowler, Mem. Bishop Mus., vol. 10, 1928, p. 35 (compiled); vol. 11, no. 5, 1931, p. 315 (references).

→ Symbranchus bengalensis Peters, Monatsber. Akad. Wiss. Berlin, 1868, p. 275 (Quingua River near Calumpit). — Günther, Cat. Fishes Brit. Mus., vol. 8, 1870, p. 16 (River Hooghly; Philippines; type of Symbranchus guttularis).

— Beavan, Fresh Water Fishes of India, 1877, p. 158 (Lower Bengal and coast district). — Day, Fishes of India, pt. 4, 1878, p. 657, pl. 167, fig. 2. — Schmeltz, Cat. Mus. Godeffroy, No. 7, 1879, p. 59 (Pelew Islands). — Károli, Termesz. Füzetek, Budapest, vol. 5, 1881, p. 184 (Siam). — Pöhl, Cat. Mus. Godeffroy, No. 9, 1884, p. 39 (Pelew Islands). — Day, Fauna British India, vol. 1, 1889, p. 71, fig. 29. — Weber, Zool. Ergebn. Reise Niederl. Ost Indien, vol. 3, 1894, p. 428 (Palima and Tjeurane Rivermouth, Celebes). — Elera, Cat. Fauna Filipinas, vol. 1, 1895, p. 586 (Luzon, Manila, Navotas). — Volz, Revue Suisse,

Zool., vol. 12, 1904, p. 481 (  ).
— Regan, Trans. Zool. Soc. London,
vol. 20, pt. 6, 1914, p. 275 (New Guinea).
? Symbranchus immaculatus (part) Bloch,
Naturg. Ausland. Fische, vol. 9, 1795,
p. 87 (Tranquebar; not Surinam
material). — Schneider, Syst. Ichth.
Bloch, 1801, p. 524, pl. 103, fig. 1
(Tranquebar).
> Sijmbranchus immaculatus Bleeker,
Naturk. Tijds. Nederl. Indië, vol. 3,
1852, p. 438 (Bandjermassing; Calcutta).
Ophisternon hepaticus Inc Clelland, Calcutta
Journ. Nat. Hist., vol. 5, July 1844,
p. 197 (204, 221), pl. 11, fig. 2 (dentition).

Arracan Coast. — Mason, Burmah Nat. Resources, 1860, p. 703 (reference).

Symbranchus guttularis Richardson, Ichth. Voy. Erebus and Terror, 1844-48, p. 49, pl. 30, figs. 14-17. Dampier's Archipelago, West Australia.

Tetrabranchus microphthalmus Bleeker, Naturk. Tijdschr. Nederl. Indië, vol. 2, 1851, p. 69. Bandjermassing, Borneo.

Unipertura laevis Kaup, Archiv Naturg., 1856, pt. 1, p. 76 (compiled).

Genus Macrotrema Regan

Macrotrema Regan, Ann. Mag. Nat. Hist., ser. 8, vol. 9, 1912, p. 390.
Type Symbranchus caligans Cantor, monotypic.

Body naked, elongate, cylindrical. Tail greatly compressed, short, tapers. Eyes vestigial, covered by skin. Lips well developed, lower reverted over lower jaw. Setaceous teeth uniserial on premaxillaries, crowded to triangle near symphysis; palatal teeth obtusely conic and stronger, uniserial, arched; lower jaw teeth still stronger, single series expanded near symphysis into semilunar band of 3 or 4 series. Front nostril smaller than hind one, edges raised, near snout tip.

22. Pandanon Island. March 23, 1909. Length 234 mm.

8003. Port Banakacan. February 23, 1909. Length 285 mm.

14945. Port Ciego, Balabac. January 3, 1909. Length 188 mm.

7048. Port San Pio Quinto, Camiguin Island. November 11, 1908. Length 328 mm.

18973. Quinalasag Island. June 12, 1909. Length 190 mm.

8973. Rapuraput Island and Strait. June 22, 1909. Length 293 mm.

6916. Santo Domingo, Batan. November 7, 1908. Length 345 mm.

20937, 7-892. Surigao. May 8, 1908. Length 64 to 66 mm.

5821. Tataidaga Point. May 15, 1908. Length 300 mm.

14308. Teomabal Island. September 18, 1909. Length 108 mm.

Hind nostril lanceolate, opening obliquely above eye. Gill opening forms single aperture which very wide and extends up sides to lateral line. Four gill arches, all with well developed gills. Vertebrae about 100. Lateral line present. Dorsal and anal low rayless folds of skin, confluent with small caudal, which with 10 rays. No paired fins.

One species in Malaya. Smaller than Synbranchus and marine in habit.

7600, 11621, 11622. Endeavor Strait. December 24, 1908. Length 210 & 263 mm.

7441. Guntao Island, Palawan Passage. December 20, 1908. Length 289 mm.

5185. Jolo market. March 7, 1908. Length 287 mm.

13348. Langao Point, Luzon. June 24, 1909. Length 198 mm.

8833, 8834. Maculabo Island. June 14, 1909. Length 278 to 298 mm.

36. Malapascua Island. March 16, 1909. Length 217 mm.

15968. Masbate Reef, Masbate. April 20, 1908. Length 166 mm.

7228. Masinloc Bay, Zambales. November 22, 1908. Length 240 mm.

4689. Nasugbu Bay. January 16, 1908. Length 162 mm.

7878. Pagapas Bay. February 20, 1909. Length 303 mm.

Macrotrema caligans (Cantor)

Symbranchus caligans Cantor, Journ. Asiatic Soc. Bengal, vol. 18, pt. 2, 1849, p. 1316, pl. 7, figs. 1–3. Pinang. — Günther, Cat. Fishes Brit. Mus., vol. 8, 1870, p. 17 (type). — Martens, Preuss. Exped. Ost Asien, Zool., vol. 1, 1876, p. 405 (Singapore).

Symbranchus caligans Bleeker, Atlas Ichth. Ind. Néerl., vol. 4, 1864, p. 119, pl. (44) 188, fig. 3 (copied).

Macrotrema caligans Regan, Ann. Mag. Nat. Hist., ser. 8, vol. 9, 1912, p. 390 (type; Singapore). — Weber and Beaufort, Fishes Indo-Austral. Archipelago, vol. 3, 1916, p. 415 (compiled).

? *Synbranchus lumbricoides* Schmeltz, Cat. Mus. Godeffroy, No. 4, 1869, p. 27. Singapore (name only).

1469

behind, teeth slightly enlarged on rounded angle. Gill rakers ?, rather long and slender.

Scales 63 to 71 along above lateral line, 59 to 67 along below lateral line; 10 to 13 scales above lateral line, ~~and middle of spinous dorsal~~ 19 to 21 below, 14 to 17 predorsal forward to occiput, 6 rows on cheek to preopercle ridge.

D. XIII, 11 or 12, sixth spine $1\frac{3}{4}$ to $1\frac{9}{10}$ in head, first ray $\frac{2}{3}$ to $2\frac{1}{8}$; A. III, 9 or 10, second spine $1\frac{3}{4}$ to $2\frac{1}{8}$; caudal 1 to $1\frac{1}{8}$, emarginate behind; least depth of caudal peduncle $2\frac{1}{4}$ to $2\frac{1}{2}$; pectoral $1\frac{1}{3}$ to $1\frac{1}{2}$; ventral $1\frac{1}{5}$ to $1\frac{1}{4}$.

Olive or grayish green on back and sides, becoming lighter

Genus Monopterus Lacépède

Monopterus Lacépède, Hist. Nat. Poiss., vol. 2, 1800, p. 139. Type Monopterus javanensis Lacépède, monotypic. (Monopteros Volta 1796 in fossil fishes a different name.)

→ ↑ Fluta Schneider, Syst. Ichth. Bloch, 1801, p. 561. Type Monopterus javanois Lacépède.

Apterigia Basilewsky, Nouv. Mém. Soc. Nat. Moscow, vol. 10, 1855, p. 247. Type Apterigia saccogularis Basilewsky, designated by Jordan, Genera of Fishes, pt. 2, 1919, p. 263. (Versura Apterygia Gray 1833.)

Uniperturа (Kaup) Duméril, Mem. Acad. Sci. Paris, vol. 27, 1856, p. 201. Type Unibranchiapertura laevis Lacépède, monotypic.

Genus Monopterus Lacépède

Monopterus Lacépède, Hist. Nat. Poiss., vol. 2, 1800, p. 139. Type Monopterus javanensis Lacépède, monotypic. (Monopteros Volta 1796 in fossil fishes a different name.)

→ Ophicardia Mc Clelland, Calcutta Journ. Nat. Hist., vol. 5, 1844, p. 191. Type Ophicardia phayariana Mc Clelland, monotypic.

Apterigia Basilewsky, Nouv. Mém. Soc. Nat. Moscow, vol. 10, 1855, p. 247. Type Apterigia saccogularis Basilewsky, designated by Jordan, Genera of Fishes, pt. 2, 1919, p. 263. (Versus Apterygia Gray 1833.)

Uniperturа (Kaup) Duméril, Mem. Acad. Sci. Paris, vol. 27, 1856, p. 201. Type Unibranchiapertura laevis Lacépède, monotypic.

resultant bands, also several as those from eye may be partially subdivided by another incomplete auxiliary, variously not reaching the tail or caudal peduncle. Iris dull rosy with dusky. Fins all uniformly dull brownish.

Red Sea, Arabia, Mozambique, Mauritius, Madagascar, Singapore, East Indies, Philippines, China. Some of my examples differ from Bleeker's figures as the latter do not show the longitudinal bands with darker narrow bordering bands. In the cheeks, however, the young show but two horizontal gray bands. Home off. Many largest example differs from Bleeker's figure of Plectorhynchus celebicus as there are 13 horizontal pale lines, his figure showing half as many.

Cryptophthalmus (not Rafinesque 1812) Franz, Abhandl. Kon. Bayer. Akad. Wiss., Math. Phys.-Kl., vol. 4, Suppl. Band 1, 1910 (1911), p. 15. Type Cryptophthalmus robustus Franz, monotypic.

Emagius Jordan, Proc. Acad. Nat. Sci. Philadelphia, 1918, p. 343. Type Cryptophthalmus robustus Franz, virtually. Emagius Jordan proposed to replace Cryptophthalmus Franz.

Enagius robustus (Franz)

Cryptophthalmus robustus Franz,

Abhandl. Kon. Bayer. Akad. Wiss.,

Math. Phys. - Kl., vol. 4, Suppl. band 1,

(1911)

1910, p. 15, pl. 3, fig. 11. Yokohama.

Body elongate, cylindrical, compressed posteriorly, narrow and short tail tapering to point. Eye small, covered by skin. Lips well formed, rather broad, Teeth small, in bands on premaxillaries, dentaries, palatines and pterygoids. Front nostrils small pores near snout end in upper lip, hind ones oval, larger, above front part of eye. Gill membranes confluent, joined with isthmus. Gill openings nearly transverse ventral slits, only superficially

confluent into single aperture. Four branchial arches, 3 anterior with vestigeal gills and 3 moderate slits between. No scales. dorsal and anal low, rayless folds of skin, confluent with small caudal, which has few rays. No paired fins.

Apparently a single species.

Jordan and Hubbs say "The name Fluta Bloch and Schneider (1801) is prior to Monopterus (Lacépède) which until 1806 appeared only as 'les Monoptères'". This is not true as in vol. 2 it occurs on p. 139, the date given as 1800 by Sherborn.

1203

Back greenish, central area of scales pale, margins much darker; below lateral line general color much lighter, becoming silvery on lower side and belly; dark areas on scales which olive above, become chrome below, whole forming oblique broken bands pointing backward along rows of scales. Top of head greenish and olive; greenish blue line from snout above nostril around upper rim of orbit, breaking into scattered blue spots on temporal region: line of azure blue under eye, may be solid or series of round dots; single spot on preorbital above. Dorsal variously shaded with olive green and opalescent; upper part of soft portion reddish brown; opalescence appearing as roundish spots or blotches on basal part; whole fin narrowly tipped with chrome. Caudal citron yellow above, purplish below, narrowly tipped with white in crotch, Anal citron yellow, tipped with white. Ventral and pectoral chrome; spine and tip of first ray in ventral white. Iris very dark golden, silvery shades above; inner angle of mouth orange, lower lip and front of maxillary white.

pre

5726, 5727, 9398. Surigao. May 8, 1908. Length 180 to 220 mm.

Monopterus albus (Zuiew)

Muraena alba Zuiew, Nov. Act. Acad. Sci. Petropol., vol. 7, 1793, p. 299, pl. 7, fig. 2.

Monopterus alba Rutter, Proc. Acad. Nat. Sci. Philadelphia, 1897, p. 61 (Swatow).

> Monopterus albus Jordan and Snyder, Proc. U. S. Nat. Mus., vol. 23, 1901, p. 838 (Okinawa; Amami-Oshima). — Jordan and Evermann, Proc. U. S. Nat. Mus., vol. 25, 1902, p. 315 (Hokoto). — Fowler, Journ. Acad. Nat. Sci. Philadelphia, ser. 2, vol. 12, 1904, p. (Padang). — Jordan and Seale, Proc. Davenport Acad. Sci., vol. 10, May 22, 1905, p. 4 (Hong Kong). — Fowler, Proc. Acad.

Nat. Sci. Philadelphia, 1905, p. 488 (Marudi, mouth of Baram, Kapuas River, Borneo). — Jordan and Richardson, Mem. Carnegie Mus., vol. 4, no. 4, Aug. 28, 1909, p. 171 (reference). — Fowler, Proc. Acad. Nat. Sci. Philadelphia, 1912, p. 8 (Batu Sangkar; Padang). — Snyder, Pr. U. S. Nat. Mus., vol. 42, 1912, p. 490 (reference for Okinawa). — Jordan and Metz, Mem. Carnegie Mus., vol. 6, no. 1, June 1913, p. 24 (Luigen). — Weber and Beaufort, Fishes Indo Austral. Archipelago, vol. 3, 1916, p. 413, figs. 210–211 (under surface of head) (Java, Lombok, Sumbawa, Banka, Bintang, Natuna, Celebes, Ceram). — Tanaka, Figures

descript. Fishes Japan, vol. 26, July 31, 1917, p. 455, pl. 128, fig. 357 (Tokyo). — Fowler, Copeia, no. 58, June 18, 1918, p. 62 (Philippines). — Ogilby, Mem. Queensland Mus., vol. 6, Dec. 19, 1918, p. 98 (Cowan Cowan, Moreton Bay). — Izuka and Matsuura, Cat. Zool. Spec. Tokyo Mus., Vertebr., 1920, p. 174 (Tokyo). — Vinciguerra, Ann. Mus. Civ. Stor. Nat. Genova, ser. 3, vol. 10, 1921–26, p. 606 (Sarawak). — Chen, Bull. Biol. Lab. Sun Yat Sen Univ., vol. 1, no. 1, 1929, p. 44 (Foochow, Kaishing, Hainan).

Fluta alba Fowler and Bean, Proc. U. S. Nat. Mus., vol. 58, 1920, p. 308 (Soochow). — Herre, Philippine Journ. Sci., vol. 23, No. 2, Aug. 1923, p. 125 (copied). — Jordan and Hubbs, Mem. Carnegie Mus., vol. 10, No. 2, June 27, 1925, p. 190 (Kyoto; Formosa). — Fowler, Proc. Acad. Nat. Sci. Philadelphia, 1927, p. 259 (Arisu; Philippines). — Nichols, Bull. Amer. Mus. Nat. Hist., New York, vol. 58, art. 1, Oct. 15, 1928, p. (reference). — Wu, Contrib. Biol. Lab. Sci. Soc. China, vol. 5, No. 4, 1929, p. 29, fig. 22 (anterior body) (Amoy). — Fowler, Proc. Acad. Nat. Sci. Philadelphia, 1929, p. 601 (Hong Kong). — Towerby, naturalist

in Manchuria, vol. 4-5, 1930, p. 300 (reference). — Fowler, Peking Nat. Hist. Bulletin, vol. 5, pt. 2, 1930-31, p. 28 (Tsinan). — Chu, Biol. Bull. St. John's Univ., No. 1, Jan. 1931, p. 20 (compiled). — Fowler, Hong Kong Naturalist, vol. 2, No. 4, Nov. 1931, p. 287 (Hong Kong).

∠ Cronopterus javanensis Lacépède, Hist. Nat. Poiss., vol. 2, 1800, pp. 138, 139. Sunda Strait, Java). — Schneider, Syst. Ichth. Bloch, 1801, p. 565 (on Lacépède). — Swainson, Nat. Hist. Animals, vol. 2, 1838, p. 336 (reference). Kaup, Archiv Naturges., vol. 22, pt. 1, 1856, p. 77. — Bleeker, Atlas Ichth. Ind. Néerl., vol. 4, 1864, p. 118, pl. 47, fig. 1 (Java, Sumatra,

Banka, Bintang, Natuna, Borneo, Celebes). — Günther, Cat. Fishes Brit. Mus., vol. 8, 1870, p. 14 (Batavia, Borneo, Sarawak, East Indies, Siam, Formosa, China, Hong Kong, Ningpo, North China, Japan, types of Symbranchus grammicus); Ann. Mag. Nat. Hist., ser. 4, vol. 12, 1873, p. 250 (Shanghai). — Sauvage and de Thiersant, Ann. Sci. Nat., ser. 6, vol. 1, Zool., 1874, p. 18 (China). — Day, Fishes of India, pt. 4, 1878, p. 656, pl. 169, fig. 1 (Burma). — Bleeker, Verhandel. Akad. Wet. Amsterdam, No. 5, vol. 18, 1879, p. 4 (China). — Peters, Monatsber. Akad. Wiss. Berlin, 1880, p. 926 (Ningpo). — Károli, Termesz. Füzetek,

Budapest, vol. 5, 1881, p. 184 (Palaboen; Canton; Ningpo; Sarawak; Mantang; Padang Simungin). — Day, Fauna British India, vol. 1, 1889, p. 70, fig. 28. — Vinciguerra, Ann. Mus. Civico Stor. Nat. Genova, ser. 2, vol. 9, 1889-90, p. 357 (Bhamo, Birmania). — Boulenger, Proc. Zool. Soc. London, 1890, p. 40 (Deli, Sumatra). — Weber, Zool. Ergebn. Reis. Niederl. Ost Indien, vol. 3, 1894, p. 428 (Buitenzorg, Tjibodas, Java; Semanik River at Solok Island, Singhara and Maamindjan, Pajakomboh, Sumatra; Tateadji Lake, Celebes). — Bartlett, Sarawak Gazette, vol. 26, No. 368, 1896, p. 180 (Sarawak River).

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China, 6e note, 1929, p. 99 (Cochin China; Cambodia). — Lowerby, Naturalist in Manchuria, vols. 4 and 5, 1930, p. 108 (reference).

Monopterus javanicus Shaw, General Zool., vol. 4, 1804, p. 33 — Cantor, Journ. Asiatic Soc. Bengal, vol. 18, pt. 2, 1849, p. 1321 (Sea of Pinang; Malayan Peninsula). — Kaup, Archiv Naturg., 1856, pt. 1, p. 77 (compiled); Cat. Apod. Fish Brit. Mus., 1856, p. 123 (Borneo; Chusan; China). — Kner, Reise Novara, Fische, 1865, p. 389 (Java; Shanghai). — Martens, Preuss. Exped. Ost Asien, vol. 1, 1876, p. 405 (Bangkok; Batavia).

Monopterus javanica Mason, Burmah Nat. Resources, 1860, p. 702 (reference).

→ [illegible] Lacépède. Hist. Nat.

Moringua javanica Ishikawa and Matsmura, Prelim. Cat. Fisher Mus. Tokyo, 189 , p.

Sulphur, Ichth., 1844, p. 116 (China Seas, Malay Archipelago, Hong Kong); Ichth. China Japan, 1846, p. 315 (Hong Kong).

Symbranchus Laeviz Me Clelland, Calcutta Journ. Nat. Hist., vol. 5, 1845, p. 220 ("Cayenne").

Symbranchus grammicus Cantor, Ann. Mag. Nat. Hist., vol. 9, 1842, p. Chusan.

Monopterus javanica Mason, Burmah Nat. Resources, 1860, p. 702 (reference).

→ Amibranchapertura laevis Lacépède, Hist. Nat. Poiss., vol. 5, 1803, p. 657, pl. 17, fig. 3. ↑ locality.

Monopterus laevis Richardson, Zool. Voy. Sulphur, Ichth., 1844, p. 116 (China Seas, Malay Archipelago, Hong Kong); Ichth. China Japan, 1846, p. 315 (Hong Kong).

Symbranchus laevis Mc Clelland, Calcutta Journ. Nat. Hist., vol. 5, 1845, p. 220 ("Cayenne").

Symbranchus grammicus Cantor, Ann. Mag. Nat. Hist., vol. 9, 1842, p. Chusan.

Ophicardia phyariana Mc Clelland, Calcutta Journ. Nat. Hist., vol. 5, 1844, p. 191, pl. 12, fig. 1. Sandoway on the Arracan Coast.

Ophicardia phayriana Mc Clelland, Calcutta Journ. Nat. Hist., vol. 5, 1844, p. 218 (Sandoway).

Ophicardia phayreana Mason, Burmah Nat. Resources, 1860, p. 702 (reference).

Monopterus cinereus Richardson, Zool. Voy. Sulphur, Ichth., 1844, p. 117, pl. 52, figs. 1-6. China Seas, Chusan, Wooeung; Ichth. China Japan, 1846, p. 315 (note). — Nichols, Proc. Biolog. Soc. Washington, vol. 31, 1918, p. 19 (Yunnan).

Fluta alba cinerea Nichols, Bull. Amer. Mus. Nat. Hist. New York, vol. 58, art. 1, Oct. 15, 1928, p. 4 (Yunnan, Szechwan, Shansi, Tungting Lake in Hunan).

Fluta alba cinereus Chu, Biolog. Bull. St. John's Univ., Shanghai, No. 1, Jan. 1931, p. 21 (compiled).

Monopterus? (vel Synbranchus?) xanthognathus Richardson, Zool. Voy. Sulphur, Ichth., 1844, p. 118, pl. 52, fig. 7. China; Canton.

Monopterus xanthognathus Nichols, Proc. Biol. Soc. Washington, vol. 31, 1918, p. 19 (Fukien).

Aphicardia xanthognatha Richardson, Ichth. China Japan, 1846, p. 316 (Canton).

Fluta alba xanthognatha Nichols, Bull. Amer. Mus. Nat. Hist. New York, vol. 58, art. 1, Oct. 15, 1928, p. 4 (Fukien, Hainan Island).

Fluta alba xanthognathus Chu, Biolog. Bull. St. John's Univ., Shanghai, No. 1, Jan. 1931, p. 21 (compiled).

Monopterus marmoratus (Temminck and Schlegel) Richardson, Ichth. China Japan, 1846, p. 315, Chusan.

Synbranchus marmoratus Bleeker, Verh. Batavia. Genootsch. (Nat. Sch. Bengal), vol. 25, 1853, p. 78 (reference).
Synbranchus eurychasma (Kuhl and Van Hasselt) Bleeker, Verh. Batavia Genootsch. (Nuriaew.), vol. 25, 1853, p. 59.

1870

Apterigia saccogularis Basilewsky, Louv. Mém. Soc. Nat. Moscow, Vol. 10, 1855, p. 247, pl. 8, fig. 2. Chinal boreali.

Apterigia nigromaculata Basilewsky, Louv. Mém. Soc. Nat. Moscow, vol. 10, 1855, p. 248, pl. 2, fig. 2. Pekin.

Cipterigia immaculata Basilewsky, Louv. Mém. Soc. Nat. Moscow, vol. 10, 1855, p. 248. Pekin.

Cryptophthalmus robustus Franz, Abhandl. Bayer. Akad. Wiss. München, Math. Phys. Klasse, vol. 4, 1 Suppl. Band 4, 1910 (1911), p. 15, pl. 3, fig. 11. Yokohama.

Depth 1 3/5 to 2 1/5 in head; tail 2 3/4 to 3 1/4 in rest of body; head 10 to 12 1/2 to caudal base, width 2 2/3 to 3. Snout 4 4/5 to 5 1/2 in head; eye 8 3/5 to 10 1/4, 1 1/3 to 2 in snout, 1 to 1 2/5 in interorbital; mouth cleft 2 to 3; interorbital 6 1/8 to 8 1/2, slightly convex. Gill opening small, inferior, extends forward about last fourth in head.

Dorsal and anal low folds, begin posterior to vent.

Dark blackish brown, belly and lower surface dull brown, scarcely

paler. dorsal and anal sometimes
with paler edges.

5501 to 5505. Malabon market. August 8, 1908. Length 230 to 428 mm.

6258 and 6259. Manila market. June 12, 1908. Length 368 to 393 mm.

17925 to 17929. Manila market. June 13, 1908. Length 304 to 400 mm.

7908 and 7909. Manila market. March 17, 1908. Length 350 to 358 mm.

5 examples A.N.S.P. Batu Sanghsar, Sumatra. ✓ Length to mm.
A.C. Harrison and H.L. Hiller.

4 examples A.N.S.P. Padang, Sumatra. A. C. Harrison and H. L. Hiller. Length to mm.

72553 U.S.N.M. Buitenzorg, Java. March 24, 1909. O. Bryant and W. Palmer. Length 174 to 310 mm. 6 examples.

1574

83985 U.S.N.M. Soochow, China.
H. Gist Gee. Length 417 mm.

# Family Amphipnoidae

Opercle and subopercle extended posteriorly into very thin membranous plates. Gills present only on second branchial arch. Accessory breathing apparatus present, diverticula of the pharynx on each side of vertebral column above gills between skull and pectoral arch. Humeral arch not connected with skull. Vertebrae 171, of which 65 caudal. Scales present.

Fresh and brackish waters of tropical Asia. These fishes are noted for their accessory respiratory air sac which communicates with the gill cavity. These organs are two small bladders similar to

6513, 8169. Alibijaban Island, Ragay Gulf, Luzon. March 6, 1909. Length 168 to 257 mm.

8086, 8088, 17767, 17768, 18272. Alimango Bay, Burias Island. March 5, 1909. Length 176 to 263 mm.

8932. Atulayan Island. June 18, 1909. Length 316 mm.

7733. Baganga Bay, Mindanao. May 13, 1908. Length 208 mm.

8358. Buang Bay, Talajit Island. March 15, 1909. Length 263 mm.

7830. Bugsuk Island. January 5, 1909. Length 243 mm.

†8720. Butauanan Island, Luzon. June 13, 1909. Length 184 mm.

8286. Cammahala, Luzon. March 11, 1909. Length 255 mm.

8715. Capulaan Bay. Pagbilao. February 24, 1909. Length 181 mm.

8728, 8980. Carbcaran, June 8, 1909. Length 218 to 293 mm.

21782 [1418]. Cebu market. March 20, 1909. Length 66 mm.

7649. Cotabato. May 20, 1908. Length 218 mm.

7542. Endeavor Strait, Palawan. December 23, 1908. Length 298 mm.

the hind parts of the lungs in serpents. They function by being filled immediately with air derived from the atmosphere. Externally when inflated they appear as two rounded protuberances. These fishes are truly amphibious and when in the water constantly rise to the surface to take in air. At times they have been found lying in the grassy sides of ponds, similar to the habit of snakes.

Alabes parvulus (Mc Culloch

Cheilobranchus parvulus Mc Culloch, Records

Australian Mus., vol. 7, pt. 4, August 30,

1909, p. 316, fig. 18. Rocks pools near

Sydney; Fishes New South Wales, ed. 2,

1927, p. 22.

Genus Amphipnous Müller

Amphipnous Müller, Abhandl. K. Preuss. Akad. Wiss., 1841, p. 246. Type Unibranchapertura cuchia Buchanan Hamilton.

Pneumabranchus Inc Clelland, Calcutta Journ. Nat. Hist., vol. 5, 1845, p. 175 (192). Type Pneumabranchus striatus Inc Clelland, designated by Jordan, Genera of Fishes, pt. 2, 1919, p. 220.

— Steindachner and Döderlein, denkschr. Akad. Wiss. Wien, math. Phys. Klasse, vol. 48, 1883, p. 11 (Tokyo). — Day, Fauna British India, vol. 1, 1889, p. 517. — Ishikawa and Matsuura, Prelim. Cat. Fishes Mus. Tokyo, 1897, p. 54. — Pellegrin, Bull. Soc. Zool. France, vol. 30, 1905, p. 84 (Baie d'Along, Tonkin). — Franz, Abhandl. Kais. Bayer. Akad. Wiss., vol. 4, Suppl. Band 1; 1910, p. 46 (Yokohama). — Pearson, Ceylon Administrat. Rep., 1912–13, p. E 14 (Gulf of Manaar).

1518

Palatine teeth uniserial, well developed. Gill membranes nearly entirely joined with isthmus, with single transverse opening. Branchial arches 3, with gill filaments rudimentary, divided by narrow slits. Branchiostegals 6. Respiratory sac on neck behind head communicating with gill cavity. Scales present, in longitudinal rows.

Cheilobranchus apteronotum Richardson, Ichth. Voy. Erebus and Terror, 1844-48, p. 51. Above high water marks on Penguin Island 72° S. Lat.

Cheilobranchus concolor Richardson, Ichth. Voy. Erebus and Terror, 1844-48, p. 51. No locality. (Named in synonymy.)

Amphipnous cuchia (Buchanan Hamilton) Cuvier, Mem. Mus. Hist. Nat. Paris, vol. 10, 1824, p. 263, pl. 16, fig. 4. (Ganges); Cuv. & Val., Hist. Nat. Poiss., vol. 15, 1840, p. 444 (Ganges); Bleeker, Verh. Batav. Genootsch. (Verh. Ned. Ind.), vol. 25, 1853, p. 61 (Calcutta); (Hal. Ichth. Bengal), vol. 25, 1853, p. 78 (reference). — Kaup, Archiv Naturg., 1856, pt. 1, p. 76 (compiled); Cat. Apodal Fish Brit. Mus., 1856, p. 120 (India). — Mason, Burmah Nat. Resources, 1860, p. 703 (reference). — Günther, Cat. Fishes

Amphipnous cuchia Buchanan Hamilton, Fishes of Ganges, 1822, pp. 16, 363, pl. 16, fig. 4. South East Bengal.

Amphipnous cuchia Cantor, Journ. Asiatic Soc. Bengal, vol. 18, pt. 2, 1849, p. 1320 (Chenaub River; Jehlum River). — Bleeker, Verhandel. Batavia Genootsch. (Nuraen.), vol. 25, 1853, p. 61 (Calcutta); (Hal. Ichth. Bengal), vol. 25, 1853, p. 78 (reference). — Kaup, Archiv Naturg., 1856, pt. 1, p. 76 (compiled); Cat. Apodal Fish Brit. Mus., 1856, p. 120 (India). — Mason, Burmah Nat. Resources, 1860, p. 703 (reference). — Günther, Cat. Fishes

Brit. Mus., vol. 8, 1870, p. 13 (Calcutta, Chilliamwallah; India). — Day, — Beavan, Fresh Water Fishes India, 1877, p. 157 (Bengal).

27. — Vinciguerra, Ann. Mus. Civico Stor. Nat. Genova, vol. 29, 1889-90, p. 356 (Biapo, 3ª dó, Burma). — Ogilby, Proc. Royal Soc. Queensland, vol. 20, 1907, p. (Edeambe [Edgecambe?] Bay).

Symbranchus cuchia Cuvier, Règne Animal, ed. 2, vol. 2, 1829, p. 354.

Symbranchus cachia Swainson, Nat. Hist. Animals, vol. 2, 1839, p. 336 (on Buchanan Hamilton; error).

Brit. Mus., vol. 8, 1870, p. 13 (Calcutta; Chilliamwallah; India). — Day, Fishes of India, pt. 4, 1878, p. 656, pl. 67, fig. 1 (Deb Daugor); Fauna British India, vol. 1, 1889, p. 69, fig. 27. — Vinciguerra, Ann. Mus. Civico Stor. Nat. Genova, vol. 29, 1889-90, p. 356 (Biapo, Id. do., Burma). — Ogilby, Proc. Royal Soc. Queensland, vol. 20, 1907, p. (Edembe [Edgecombe?] Bay).

Symbranchus cuchia Cuvier, Règne Animal, ed. 2, vol. 2, 1829, p. 354.

Symbranchus cachia Swainson, Nat. Hist. Animals, vol. 2, 1839, p. 336 (on Buchanan Hamilton; error).

Aphichthys punctatus Swainson, Nat. Hist. Animals, vol. 2, 1839, p. 336 (on Buchanan Hamilton).

Pneumabranchus cinereus Mc Clelland, Calcutta Journ. Nat. Hist., vol. 4, 1844, p. 219, pl. 4, fig. Chusan and Ningpo, China; vol. 5, 1845, p. 219 (copied).

Pneumabranchus striatus Mc Clelland, Calcutta Journ. Nat. Hist., vol. 5, 1844, pp. 192, 219, pl. 13 (compiled from Buchanan Hamilton). — Mason, Burmah Nat. Resources, 1860, p. 702 (reference).

Pneumabranchus leprosus Mc Clelland, Calcutta Journ. Nat. Hist., vol. 5, 1844, pp. 195, 219. Bengal.

1522

Pneumabranchus albinus Mc Clelland,
Calcutta Journ. Nat. Hist., vol. 5, 1844,
pp. 196, 219. Bengal.